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10/775,849	02/09/2004	Haixin Yang	EL0543USNA	1160

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EXAMINER	
ORLANDO, MICHAEL N	

ART UNIT	PAPER NUMBER
1791	

NOTIFICATION DATE	DELIVERY MODE
12/12/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-Legal.PRC@usa.dupont.com

Office Action Summary	Application No.	Applicant(s)	
	10/775,849	YANG, HAIXIN	
	Examiner	Art Unit	
	MICHAEL N. ORLANDO	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The arguments amendments submitted October 8, 2008 have been fully considered and the original 102 is hereby withdrawn. The provisional double patenting has also been overcome in lieu of the terminal disclaimer filed by the applicant. The merits of the claims, however, continue to be unpatentable over the prior art as set forth below.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 41 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There does not appear to be a teaching that the substrate is treated with said ink composition before printing with an ink composition. In fact the specification only goes so far as to suggest surface treatment of the substrate to prepare it for the special ink composition. No evidence is found whereby applicant's ink composition is itself the pre-treatment of the substrate prior to ink printing (instant specification; page 11).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodas et al. 2003/0148024 in view of Bishop 5,744,245.

Kodas et al. disclose a method of making conductive electronic features comprising: applying a composition by ink jet printing to a substrate such as a glass substrate, ceramic substrate or polymeric substrate, the substrate treated by various methods including surface energy patterning the surface of the substrate or modifying the surface tension of the substrate with a surfactant, the ink jet printable composition comprising:

(1) molecular metal precursors and spherical micron-sized metal particles (a functional material of an element having electrical properties and uncoated),

(2) one or more polymers; dispersed in

(3) solvent by itself or with water,

wherein the viscosity of the composition is preferably not greater than 50 cP for ink jet printing (50 mPas) such as in the range of 10-40 cP (10-40 mPas);

and heating to form the conductive feature, the heating including sintering the particles or the precursor ([0018]-[0280], [example 22]). Kodas et al. disclose that the one or more polymers can be thermoplastic or thermoset polymers but do not specifically disclose that the one or more polymers in the composition includes polyvinyl pyrrolidone. Kodas also discloses that the firing of the composition determines, among other things, the level of conversion for the precursors and subsequent conductive nature of the composition ([example 22]).

Bishop teaches that in an ink jet printable composition for forming electrically conductive pathways on insulating materials such as ceramic or glass substrates and comprising a metal precursor and additive such as metal powder, the polymeric resin in the composition preferable formed a solution, dispersion or emulsion in the water/co-solvent mixture and suitable resin are known materials, preferably one or more of polyvinyl pyrrolidone resins, polymethacrylic resin and polycellulose ether resins (col. 7, lines 42-67).

It would have been obvious to one of ordinary skill in the art to have modified the method of Kodas et al. for making conductive electronic features on a glass substrate by providing the polymer in the composition as polyvinyl pyrrolidone, as taught by Bishop, as one of the preferable polymeric resins used in an ink jet printable

composition for forming electrically conductive features on substrates such as of glass. The use of polyvinyl pyrrolidone as the polymer forming a solution, dispersion or emulsion in the solvent would have been obvious to one of ordinary skill in the art because Kodas et al. do not limit the polymer that can be provided in the composition and Bishop teach that polyvinyl pyrrolidone is one of the preferred polymers used in such compositions, thus motivating one to provide polyvinyl pyrrolidone as an organic polymer for dispersing the spherical metal particles (functional material), as claimed.

As to the presently claimed firing parameters it is already appreciated by Kodas that such parameters (i.e. time and temperature) determine the conversion of the precursors and subsequent conductivity (example 22]). It would have therefore been obvious to modify such parameters in view of Kodas in order to obtain the desired amount of precursor conversion and conductivity absent a showing of unexpected results by the applicant. The courts have held that discovering an optimum value of a result effective variable (in this case modifying the firing time and temperature were known to affect precursor conversion and conductivity) involves only routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Also, note that generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical (i.e. the applicant shows satisfactory unexpected results). "[W]here the general conditions of a claim are disclosed in the prior art (in this case modifying the time and temperature of the firing to effectively tailor the precursor conversion and conductivity), it is not inventive to discover the optimum or workable

ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results

4. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over (DE 19846096) in view of Kodas et al. (US 2003/0148024).

DE 19846096 discloses a method of making structured, electrically conductive areas on substrates comprising:

applying a composition by ink jet printing to a substrate such as a glass substrate to form structured areas and conductive strips, the ink jet printable composition comprising:

(1) spherical ternary oxide particles (a functional material of a compound having electrical properties and uncoated),

(2) at least one dispersing agent such as polyvinyl pyrrolidone; dispersed in

(3) solvent such as water, organic solvent or mixture thereof; and wherein the viscosity of the composition is less than 20 mPas, preferably 0.5-10 mPas (thus

overlapping the claimed range of 5-50 mPas, and sintering at 400°C (computer translation, pgs. 2-17).

DE 19846096 does not explicitly disclose the firing temperature (used 400°C instead) and also does not disclose printing on a treated substrate that has been treated with the above ink composition.

As to the treatment with said ink composition, such can merely be taken as the same process, or as a duplication of the ink jet printing process above whereby it would have been obvious to one having ordinary skill in the art to duplicate such a process in order to produce the predicated result of optimally controlling and/or modifying the thickness of the printed layers. Note that the courts have held that a mere duplication of the essential working features of an invention involves only routine skill in the art. (St. *Regis Paper Co. v. Bemis Co., 193 USPQ 8).*

As to the presently claimed firing parameters, Kodas also discloses that the firing of the composition determines, among other things, the level of conversion for the precursors and subsequent conductive nature of the composition ([example 22]). It is already appreciated by Kodas that such parameters (i.e. time and temperature) determine the conversion of the precursors and subsequent conductivity (example 22]). It would have therefore been obvious to modify such parameters in view of Kodas in order to obtain the desired amount of precursor conversion and conductivity absent a showing of unexpected results by the applicant. The courts have held that discovering an optimum value of a result effective variable (in this case modifying the firing time and temperature were known to affect precursor conversion and conductivity) involves only

routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Also, note that generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical (i.e. the applicant shows satisfactory unexpected results). "[W]here the general conditions of a claim are disclosed in the prior art (in this case modifying the time and temperature of the firing to effectively tailor the precursor conversion and conductivity), it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results

5. Claims 1 and 3-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodas et al. (US 2003/0148024) in view of Bishop (US 5,744,245) and either Grundy (US 4,859,241) or Kydd (US 6,036,889).

Kodas et al. disclose a method of making conductive electronic features comprising: applying a composition by ink jet printing to a substrate such as a glass substrate, the substrate treated by various methods including surface energy patterning

the surface of the substrate or modifying the surface tension of the substrate with a surfactant, the ink jet printable composition comprising:

(1) molecular metal precursors and spherical micron-sized metal particles (a functional material of an element having electrical properties and uncoated),

(2) one or more polymers; dispersed in

(3) solvent by itself or with water,

wherein the viscosity of the composition is preferably not greater than 50 cP for ink jet printing (50 mPas) such as in the range of 10-40 cP (10-40 mPas); and

heating to form the conductive feature, the heating including sintering the particles or the precursor [0018]-[0280].

Kodas et al. disclose that the one or more polymers can be thermoplastic or thermoset polymers [0124] but do not specifically disclose that the one or more polymers in the composition includes polyvinyl pyrrolidone. Kodas et al. disclose that surfactants can be used to maintain the particles in suspension [0225] but do not disclose providing the spherical micron- sized metal particles as coated with a fatty acid. Kodas also discloses that the firing of the composition determines, among other things, the level of conversion for the precursors and subsequent conductive nature of the composition ([example 22]).

Bishop teaches that in an ink jet printable composition for forming electrically conductive pathways on insulating materials such as ceramic or glass substrates and comprising a metal precursor and additive such as metal powder, the polymeric resin in the composition preferable formed a solution, dispersion or emulsion in the water/co-

solvent mixture and suitable resin are known materials, preferably one or more of polyvinyl pyrrolidone resins, polymethacrylic resin and polycellulose ether resins. The amount of resin in the composition is usually 5-45% (col. 7, lines 42-67, col. 8, lines 21-23).

Grundy teaches that silver powder-filled paste is provided with stable viscosity over a wide range of storage and application temperatures which insures consistent paste performance by coating the silver powder with a surfactant such as silver stearate (col. 1, lines 32-56).

Kydd teaches that metal powder in a composition for providing conductors on a substrate by printing is stabilized by coating the metal powder with a surfactant such as stearic acid to prevent premature agglomeration of the metal particles (col. 8, line 66 - col. 9, line 2).

It would have been obvious to one of ordinary skill in the art to have modified the method of Kodas et al. for making conductive electronic features on a glass substrate by providing the polymer in the composition as polyvinyl pyrrolidone, as taught by Bishop, as one of the preferable polymeric resins used in an ink jet printable composition for forming electrically conductive features on substrates such as of glass. The use of polyvinyl pyrrolidone as the polymer forming a solution, dispersion or emulsion in the solvent would have been obvious to one of ordinary skill in the art because Kodas et al. do not limit the polymer that can be provided in the composition and Kodas et al. teach that polyvinyl pyrrolidone is one of the preferred polymers used

in such composition, thus suggesting to provide polyvinyl pyrrolidone as an organic polymer for dispersing the spherical metal particles (functional material), as claimed.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Kodas et al. by providing the spherical metal particles as coated with a fatty acid, as taught by Grundy, to provide the composition with stable viscosity over a wide range of storage and application temperatures which insures consistent composition performance, or as taught by Kydd, to prevent premature agglomeration of the particles. Coating the particles with either silver stearate (a salt of stearate) or stearic acid, each a fatty acid, would have been obvious to one of ordinary skill in the art, to provide the composition with stable viscosity during storage, as taught by Grundy, or to stabilize the metal particles by preventing agglomeration, as taught by Kydd. By providing the particles as coated with fatty acid to stabilize the particles, the composition provided obviously has a stability of up to 24 hours, as claimed in Claims 4 and 22.

As to the presently claimed firing parameters it is already appreciated by Kodas that such parameters (i.e. time and temperature) determine the conversion of the precursors and subsequent conductivity (example 22]). It would have therefore been obvious to modify such parameters in view of Kodas in order to obtain the desired amount of precursor conversion and conductivity absent a showing of unexpected results by the applicant. The courts have held that discovering an optimum value of a result effective variable (in this case modifying the firing time and temperature were known to affect precursor conversion and conductivity) involves only routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Also, note that generally,

differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical (i.e. the applicant shows satisfactory unexpected results). "[W]here the general conditions of a claim are disclosed in the prior art (in this case modifying the time and temperature of the firing to effectively tailor the precursor conversion and conductivity), it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results

Regarding Claims 3 and 21, the viscosity for ink jet printing is in the range of 10-40 cP (10-40 mPas) [0220].

Regarding Claims 5, 6, 16, 23, 24 and 35, the molecular metal precursors can be silver, copper, silver and palladium, platinum, gold or nickel and the micron-sized particles can be silver, palladium, copper, gold, platinum and nickel or insulating phase such as titania [0031], [0257]-[0263].

Regarding Claims 7, 9, 25 and 28, surfactants can be used to modify the substrate to achieve the values of surface tensions and interfacial energies required [0191].

Regarding Claims 8 and 27, the surface tension of the composition is chosen to be 5, 10, 15, 20 or 25 dynes/cm greater than that of the substrate, ink jet heads require surface tensions of 20-50 dynes/cm depending on the type of ink jet head, most electrical substrates have surface tension values in the range of 18 to 45 and glass has a surface tension of 30 dynes/cm [0184] - [0186], [0194].

Regarding Claims 10-12 and 29-31, the composition can include a monomer curable by thermal or UV means and immediately exposed after deposition to polymerize and thicken and reduce spreading of the composition [0160], [0239].

Regarding Claims 13-15 and 32-34, the micron-sized particles have media particle size of at least 0.1um but preferably not greater than 20um [0032].

Regarding Claims 17 and 36, the conductive features have average width not greater than 250um [0279] (encompassing the claimed range of 100um- 165um).

Regarding Claims 18 and 37, the conductive feature can have an average thickness of greater than 0.01um, even greater than 1um [0276] (encompassing the claimed range of 1.8um - 2.0um).

Regarding Claims 19 and 38, the resistivity of the conductive features is not greater than 20 times the resistivity of the bulk conductor [0021].

Regarding Claim 26, the substrate can be glass or ceramic [0156].

Regarding Claim 39, Bishop teaches that the amount of resin in the ink jet printable composition is usually 5-45%. Providing polyvinyl pyrrolidone in the composition in amount of 5-45%, encompassed in the claimed range of 2 wt% or greater, would have been obvious to one of ordinary skill in the art, as taught by Bishop, as the usual amount of resin in the composition.

Response to Arguments

Applicant's arguments filed 10/08/2008 have been fully considered but they are not persuasive.

The arguments towards the 102(b) rejection are moot since the rejection has been withdrawn in lieu of the amendments. The 103 rejections still apply.

The applicant contends that Bishop and Kodas would not have been combinable in lieu of the fact that they are from different fields of endeavor.

The examiner disagrees and notes that both Bishop and Kodas are drawn to metal-based (conductive) compositions for deposition onto substrates such as glass. Whether or not their intended use is different (i.e. patterning for circuit conduction or for decoration) the general principle of applying a similar metal based composition onto glass substrates would have commended the attention of an ordinary skilled artisan. It would be clear when looking to develop a metal-based composition for deposition onto glass to look to other similar cases of depositing metal-based compositions onto glass for guidance.

The applicant argues that the prior art fails to teach coating the spherical particles with fatty acid for claims 40 and 41.

There is no requirement in the claims for such a coating as claims 40 and 41 require uncoated particles. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., fatty acid coated particles) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Regarding claims 1 and 3-39, the applicant argues the shortcoming of Kodas.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The applicant also further contends to the combinability of Bishop and Kodas.

The basis for such a combination is provided above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL N. ORLANDO whose telephone number is (571)270-5038. The examiner can normally be reached on Monday-Thursday, 7:30am-4:30pm, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip C. Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MO

/Philip C Tucker/

Supervisory Patent Examiner, Art Unit 1791